WTCI-664-P

Cheri Sawyer

From: Bhol, Saroj [sbhol@panynj.gov]
Sent: Friday, May 06, 2005 9:02 AM
To: sunder@nist.gov
Cc: rbukowski@nist.gov; jason.averill@nist.gov; james.lawson@nist.gov; cauffman@nist.gov; cheri.Sawyer@nist.gov; Begley, James; Fadavi, Ali; Lin, C. John; Lombardi, Frank; Reiss, Alan
Subject: Exits for Assembly Use Spaces

Shyam,
Here's the response to the questions in the attachment.
Thanks
Saroj

(The numbers relate to the questions)

1. PA reaches out to the NYC Department of Buildings (DOB) for code clarifications and interpretations. Based on PA's meeting on exits from the Windows on the World with the DOB on December 6, 1994, it's PA's understanding that "20% of the floor area" in section 27-367 is intended to be the total floor area in the building occupied by the principal use.

2. There are no other section in the code on exit reduction beside section 27-367.

3. During the meeting with the DOB, the need for a fourth stair did not arise.

-----Original Message-----
From: Shyam Sunder [mailto:sunder@nist.gov]
Sent: Monday, May 02, 2005 1:19 PM
To: Bhol, Saroj
Cc: rbukowski@nist.gov; jason.averill@nist.gov; james.lawson@nist.gov; cauffman@nist.gov; cheri.Sawyer@nist.gov
Subject: Exits for Assembly Use Spaces

Saroj,

Attached is a request for information/clarification regarding the numbers of exist required for the assembly use spaces at the top of the WTC towers. Please be advised that NIST has not made a determination whether the WTC towers required four stairwells as a result of these spaces. We would appreciate your response in the near future.

Shyam

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see file WTCI-138-NYC for NYC DOB clarification

Number of Exits Required in the Assembly Use Areas of the WTC Towers
All of the building codes examined in this study contain nearly identical requirements for Means of Egress, so this discussion will focus on the (1968) New York City Building Code (NYCBC). The building code (27-366) requires that every floor shall have "... *at least two independent exits, remote from each other* ..." except for one and two family dwellings and certain group J (multifamily residential) buildings. Subparagraph 3 of this section states further that,

"Notwithstanding any other provision of this section, when, within a building, any place of assembly has an occupant load between five hundred and nine hundred ninety-nine persons, there shall be provided at least three independent exits, remote from each other, from each floor; ***any such place of assembly with an occupant load of one thousand or more persons shall be provided with at least four independent exits, remote from each other, from each floor*** *(emphasis added)."*

However the next section provides for reductions in the number of exits required as follows:

*"**27-367 Exit reduction** - When a floor area has access to areas of refuge that comply with the requirements of section 27-372 of article five of this subchapter, the number of persons for whom vertical exits are to be provided may be reduced to fifty percent of the occupant load of the floor area when one area of refuge is provided, and may be reduced to thirty-three percent of the floor area when two areas of refuge are provided. This section shall not be applicable to any new or altered place of assembly, except for such places of assembly in fully sprinklered office buildings* ***which occupy less than twenty percent of the floor area occupied by the principal use*** *(emphasis added)."*

For the office floors the occupant load was no more than 390 and only two exits (providing a minimum of 6 ½ units of exit width, total) were required. Three exits providing a total of 6 ½ units of exit width were present.

For Windows on the World (floors 106 and 107 in WTC 1), however, the occupant loads were 1,013 and 1,130 respectively and the capacity of the stairs was increased to 1,170 by the creation of three areas of refuge, arranged in accordance with the requirements of section 27-372. Similarly for Top of the World (floor 107 in WTC 2) the occupant load calculated by the code required method was 1,751, but was limited to the 1,170 stair capacity (permitted by the creation of three areas of refuge) by order of The Port Authority and enforced by the tenant.

Applying the NYCBC provisions to Windows on the World and Top of the World:

- 27-366 (3) calls for four independent exits, except as modified by the next section.
- 27-367 does not appear to be applicable since all three floors were altered places of assembly (they had been renovated after the 1993 bombing) and:
    - The buildings do not appear to have been fully sprinklered in 1995.

- It appears the buildings were fully sprinklered by September 11, 2001 (as late as 1999 the sprinkler system being installed on the skylobby floors). However, the places of assembly occupied more than twenty percent of the floor area occupied by the principal use on those floors (which was assembly use).

Questions for the Port Authority of New York and New Jersey:

1. How does the PANYNJ interpret above sections 27-366 and 27-367 of the New York City Building Code?

2. Are there other sections of the New York City Building Code that would have allowed a different interpretation regarding the number of exits required?

3. On what basis does the PANYNJ conclude that a fourth exit was not required?